

x c Engelbart
Feinler

SRI - AH1

To: History File

From: Charles Bourne

9/17/98

Re: Notes from 2/19/98 Visit to SRI

1. Staff

Fran Magee (326-3025), Administrative Secretary to Don Nielson (Vice President of Computing Engineering & Sciences Division), was my host to allow me to view some videos that Nielson had. Marlyn Johnson (859-2444), who worked for Jake at SRI's Network Information Center (NIC) from 1983-93, and later replaced Jake Feinler, joined me for some of the video viewing, and said she would be available for any additional follow-up questions.

Johnson said that Elizabeth (Jake) Feinler was still in the Menlo Park area, and her home phone was 323-0841.

Magee checked with SRI's H.R. Department, and their alumni listing, and found that: (a) they have no record of me as an ex-SRI employee; (b) Leonard Chaitin left SRI in August 1981, and now lives in Texas; (c) Elmer Shapiro, who did much of the early NIC work, is still around in the Menlo Park area.

2. The 1968/69 Engelbart Video

I viewed the first part of a three-tape video of Doug's San Francisco presentation. The film shows Doug demonstrating his system before a large auditorium audience. The film does not include an introduction to the speaker. The displayed introductory text identified it as a 12/8/68 presentation to the FJCC in San Francisco. The venue is not mentioned in the presentation, although Doug did say something like, "I've been working on this for six months now."

The viewing is fuzzy, but it looks like a 12/9/68 date is given in one of the computer displays.

Doug's 1973 AFIPS paper states that a film of the 1969 ASIS Conference presentation is available from SRI-ARC. I recently asked Roger Sherman, SRI Librarian (859-5981), about getting a copy. He checked with Lisa Beffa, the Archivist (859-5506), and found that they don't have any record of the movie and are, thus, unable to provide any copies. He referred me to Fran Magee. Sherman also said that Don Nielson has his own copy and is known to have made copies for others. Nobody knows who has copyright title to the film.

The film mentioned that the AHI Project "now had ARPA, NASA and RADC support," and mentioned other early sponsors. (I believe he mentioned Hal Wooster at AFOSR.)

Doug said, "I don't know why we called it a mouse. It just started that way. And we never thought the name would stick."

Persons mentioned in the film or in the later Xerox PARC presentation were Don Andrews, Bill English, Charles Irby (who joined SRI for 7 years after seeing the 1968/69 demo), Jeff Lewis (software), Bill Paxton.

There is a possibility that this film was actually the 1969 ASIS San Francisco demonstration. That needs checking.

3. 1986 ACM Video

On January 9-10, 1986, Xerox PARC hosted an ACM-sponsored Augmented Knowledge Workshop. Doug made a presentation at that event, including a repeat of some of the original 1968/69 S.F. video. Doug's presentation was taped and copyrighted (1986) by ACM.

In that presentation, Doug mentioned that Stanford has plans for an archive of computer history, and the AHI archives will be there. Mention was made of Stanley Lowen as the person to contact.

Doug stated the following timeline for AHI:

- 1951-57 Preparing and searching.
- 1959-64 AFOSR (Hal Wooster) for conceptual framework. 1962 SRI publication was their first major report.
- 1967 Did collaborative meetings with CRT displays.
- 1969 Had a good working system. ("I was lucky when Licklider came to ARPA.")
- 1969-70 Busy changing computers all the time.
- 1974+ Had real users on the service
Then the project was sold to Tymshare.
McDonald Douglas was a good participant because of their extensive CAD experience and use.
- 1975-76 Added graphics and multimedia capability.

The workstations were TV monitors, fed from a video camera trained on a single high resolution (Tektronix?) CRT computer output display. The CDC-160 workstation used a custom-made CRT display. Doug gave a lot of credit to Bill English.

Then Doug introduced, showed, and talked about the 1968/69 video. This was the first version of a large-scale video projection system, displaying a TV image onto a 20' screen for the auditorium audience. The demonstration required the leasing of two video lines from SRI to S.F. (one for the screen, one for face shots or other visuals). This required two dish antennas and two repeater trucks on the Skyline hilltop as repeater links. About 17 people were involved in the actual demonstration. They were using the NLS software as it existed at that time, and it was a huge gamble for Doug.

This video is probably available from ACM.

To: History File

From: Charles Bourne

Re: Notes of May 2, 1998 Call to Elizabeth (Jake) Feinler (650/323-0841)

1. SRI-AHI. Jake remembers Doug Engelbart's big demonstration of the AHI system, and believes that it was probably at the joint AFIPS/JCCC Meeting in 1971 or 1972, somewhere outside of California. She remembers it because she moved to Doug's group from another group at SRI in 1972, and there was a big push by the sponsor (DARPA) to make the presentation, and she was too new to the group to get to travel to that meeting. It might have been for the FJCC in 9/72 in the Washington, D.C. area.
2. Staff Update. Jake subsequently left SRI to go to NASA at Moffett Field, working on networking systems. She is now fully retired, and can be reached at home:

308 Barton Way
Menlo Park, CA 94025

She is currently writing a book about the history of ARPANET.

She said that Bill English can be reached at

wenglish@ix.network.com

3. Computer History Museum. Jake is currently working as a volunteer for this local organization.

CHARLES BOURNE AND ASSOCIATES

1619 Santa Cruz Avenue
Menlo Park, California 94025
(650) 322-7101

May 14, 1998

Jake Feinler
308 Barton Way
Menlo Park, CA 94025

Jake - just in case you did send me something, this is just to let you know that I haven't received anything from you since I sent this letter.

Dear Jake:

It was good to talk with you the other day, and hear that you'd be willing to review some draft text material for me. Now that I've retired from DIALOG, I am able to spend more time working with Trudi Bellardo Hahn of the University of Maryland, to write a book for Academic Press on the early (pre-1977) history of the online search services and technology.

*char
7/26/98*

Because you were a direct participant and observer in these activities, we'd appreciate whatever help you can provide in our task. We've gone about as far as we can go from the published material that we've been able to get our hands on. Now we need to have the current draft checked by the people who were on the scene at that time—to correct the factual mistakes, fill in some of the missing pieces, and to provide additional comments as appropriate.

With that introduction, I invite you to review the enclosed draft text of the early SRI story. I've been unable to locate Bill English, and I've received no responses to the letters I've sent to Doug Engelbart. That makes your review even more important to me.

I'm particularly interested in pinning down where and when the big demos were made (1968 AFIPS? 1969 ASIS? 1971-72 AFIPS/ICCC?), and how people can obtain a copy of the film. Relevant to that issue, I've enclosed some additional background information. I've also enclosed a copy of the notes I took at the recent SRI visit, so you can correct or augment my faulty note taking.

You mentioned that Doug was preparing for a big push for an out-of-state demonstration in 1971 or 1972. Could that have been the June 1973 AFIPS meeting in New York where he presented a paper (see enclosed)?

You may notice that some of the text is in boldface. That's just a temporary artifice to permit me to keep track of my own text and source material so that I can remember where things came from. You may also see some notes passed between Trudi and me as part of the dynamic text-building process. Furthermore, there may be some duplicate citations that have not yet been consolidated.

I'd like to get your comments back in a week or two if that's possible. Just mark up and return the text if that's easiest for you. If you have any questions or comments, please give me a call. I'd also appreciate your suggestions for additional reviewers. I look forward to hearing from you.

Best regards,



Charles P. Bourne

Enclosures: Table of Contents, Introduction, SRI text & supporting cites from Chapter 3 (3/10/98 edition)
Notes of 2/19/98 SRI visit
Reprint of DCE 6/73 AFIPS Conference paper

xc: Trudi Bellardo Hahn (letter only)

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xc: Trudi Bellardo Hahn (letter only)

XC SRI-AHI
ENGELBART
STANFORD ARCHIVE

To: History File

From: Charles Bourne

Re: Notes of 7/29/98 Meeting With Jake Feinler

1. Jake's Background. Jake worked at SRI from 1960 to 1989. She had previously worked for Chemical Abstracts Service. She started in SRI's Chemistry Department, providing literature support services to that group. In 1972, she joined Engelbart's group to head up the ARPA Network Information Center (NIC) which grew from a small office to a \$6 million project, at which time she left to go to work for NASA.

2. The Engelbart Demo. The major demo that Jake remembers was in September(?) 1972. She thinks it was an ICCC (International Computer and Communications Conference?) meeting held every other year. This particular meeting, held jointly with the FJCC, was the first big demo of the ARPANET, with about 30 hosts on the system. Lots of SRI people went to the conference, but she didn't get to go. Jake and Jacques Valey did the first easy (user-oriented) query language for that system, as an alternative to the more programmer-oriented NLS system commands.

The NLS system was at some point renamed the AUGMENT system.

Review Comments. In her written comments on her review copy of the history draft, she wrote:

IFIPS Meetings

In 1972, ARPA had a big demonstration of the ARPANET. This was a combined ICCC/FJCC conference. Jacques Valey and myself worked on a user interface to NLS for it and that was the "big flap" meeting I was referring to. All the ARPA network contractors gave presentations. I do not know whether Doug did his demo there. (Check the Proceedings.) I was very new to ARC and it was total chaos at that particular time.

I also gave a paper as an invited speaker at an ASIS meeting in San Francisco in early '70 outlining ideas for "An Electronic Yellow Pages" which I believe was first time that concept was presented. Unfortunately the paper did not get included in the proceedings. For years I had my copy, but don't know what happened to it. It was online but we lost so much stuff shifting from one computer to another, that it disappeared.

My group also did first versions of network information servers, accessible by users locally (on their hosts) but accessing remote databases e.g. WHOIS (electronic white

pages & name server) and TACNEWS (online newsletter). This approach later became the norm or standard for delivering network information.

4. AHI Project Support. ARPA put in 3 years of seed money, and then by policy, had to turn it over to another organization for R&D support. RADC was that organization. Then SRI started to sell online support time for users at several government agencies (RADC, BRL), but this started to cause flack from the commercial sector (e.g., for electronic mail service) about SRI as a nonprofit going into competition with the private sector. That flack, plus some uncertainties regarding slow and continuing federal support, led SRI management (Ed Jones) to decide to drop the AHI activity. SRI "sold" the activity to Tymeshare in 1977.

5. Other History Information Sources. Stanford has an academic program on "The History of Science." Jake said that Henry Lowood is the person to contact. Engelbart had office space at Stanford for his early Bootstrap Institute days, and kept much of his archive material there. Apparently, he gave his archive materials to this Stanford program when he moved his office to Fremont. Lowood is apparently the curator for Doug's papers.

Jake has boxes of archive stuff in her garage, but it all got mixed in the 1989 quake, and was hastily put back up in shelves and boxes, and is in no shape to look through to find anything. She hopes to get to that eventually, when she starts to write her book about the development of ARPANET.

xc: Trudi

March 10, 1998

7/29/98 comments from John Feinler

CHAPTER 3

Early Research and Development Activities

1960-65

Introduction

System Development Corporation

SATIRE 1962-63+

Time-Sharing System (TSS) 1963-69+

Protosynthex/Synthex 1960-68

TEXTIR 1964-66

LUCID 1962-68+

BOLD 1964-67

Multilist Study 1964+

FTD 1964-66+

MICRO 1965-

Other SDC Efforts

Stanford Research Institute

MIRF 1960-64

Augmented Human Intellect Program 1959-76+

SRI Online System 1963

University of Pennsylvania.

Multilist 1960-68+

Multilist for Inventory Control 1962-

Multilist for Library Applications 1964-66+

Computer Command and Control Co. 1965+

CIDS 1966-70+

ACM Repository 1965+

SOLER 1967+

EASY ENGLISH and REAL ENGLISH 1967?

USDOCTOR 1969+

Massachusetts Institute of Technology

Project MAC 1961-

Bibliographic Coupling Studies 1958-66+

TIP 1962-67+

American Library Association

Library-21 (Seattle) 1962

Library/USA (New York) 1964-65

International Business Machines Corporation

Charlie, I worked for Chem Abs in the mid-50s. They were beginning to automate (as were other large indexing services) because of the scientific literature explosion due to Sputnik and cold war in 50's. The cost of hand processing was more than anyone could keep up with and the main thing computers could do ^{Chapter 3} fast was sort and alphabetize which took humans forever, relatively speaking. _{2 and print}

About half (CB note: Trudi—almost all of the systems described in this text.) of the earliest systems provided access to a bibliographic database and the rest used a database containing some other sort of information—encyclopedia articles, inventory data, or chemical compounds. Another important distinction among them was their underlying goal. For some developers, the main point was to conduct basic research on linguistic and artificial intelligence phenomena and human-computer interfaces. Others designed systems with the practical goals of providing better, cheaper, faster access to library records. Some developers used their systems to study searching behavior or to explore how scientists used the literature. Others used theirs for testing programming and text storage innovations, facilitating data entry and manipulation from online terminals, or enhancing human control over human-computer interactions.

The pioneers tended to work independently. Most concentrated single-mindedly on their own projects, with their own objectives, their own visions and goals to energize their creative genius, and their own technological and economic limitations to temper their dreams. They all benefitted from enlightened sponsors who provided the freedom, and usually the financial and other resources to permit this work to be done. Anecdotal evidence from our interviews, however, suggests that the pioneers were trying as much as possible to keep up with what others were doing; they all were driven to a certain extent by a desire to compete—to build a retrieval system better than anybody else's.

(CB note: The nature of the R&D work done in these early years was that there were a fairly small number of computer installations available for researchers to work with, and an even smaller number of time-shared systems in operation that would permit the practical use of a computer for such experimentation. The relative scarcity and accessibility of data transmission equipment and facilities for remote terminal operations further constrained the sites where this type of R&D work could be done. As a result, there were a small number of primarily federally-funded time-shared computer facilities available (e.g., SDC, SRI, MIT, University of Pennsylvania, MITRE Corporation) that permitted a few interested and very fortunate people to have access to those tools to do their research work. This is very analogous to earlier situations where researchers worldwide had relatively limited access to other scarce research tools such as linear accelerators, large telescopes, or satellite payloads. That situation is less of a problem these days.

One contributing factor in the development and growth of online systems and techniques was the role of the project monitors of the various funding agencies who actively promoted the

seem to remember some joint efforts by NFIAS? to standardize the thesauri of major search services which drove some of the automation activity too.
NFIAS = NAL, tell of indexing and Abstracting Services (or NFAIS??)

on at SRI at that time, the developers were perhaps jaded by their exposure to, and involvement in, so many other new developments that this particular demonstration seemed to be merely a logical extension of work already going on in other application areas. They judged that it did not warrant any further dissemination other than via the technical report literature system. The system did not even get a name; even though catchy names or acronyms were much in fashion in those days. The project manager for this early online system (Bourne), in fact, had forgotten about this project until he came across the associated records during the research phase of this book. As mentioned earlier in this chapter, what now seems to have been another proposal for an early online bibliographic search system, SDC's SATIRE system as reported by Roach, was known to Bourne at the time that the SRI system was first demonstrated. Both Bourne and Roach attended a March 1963 IBM-San Jose Workshop on the Application of Computers to Information Storage and Retrieval Problems where Roach presented a description of his system; Bourne also attended the ADI meeting in October 1963 where Roach's paper was presented.

Although the ESD support did not continue with the SRI-SDC demonstration project, the AHI lab work continued during the 1960s as a major contractor- and SRI-supported facility. In 1964-65, for example, an experimental word processing system using a Friden punched paper tape typewriter (Flexowriter), a chord handset for one- or two-handed data entry, a CDC-160A computer and text-editing software, was used to compose much of the original drafts of the project reports.

In 1968, the AHI Research Center facility was operating with its own SDS 940 time-sharing computer at SRI, serving 12 workstations simultaneously. Each workstation was equipped with a CRT display, alphanumeric keyboard, 5-key handset, and a mouse. This arrangement allowed any of its users to compose, edit, and search text and other files online, and to interact with team members via online conferencing, however, the system did not have a general question-answering capability.¹⁵⁴ At this time, the group was focusing their attention on systems for computer aid to management, such as aids to conferencing and group interaction.¹⁵⁵

In 1968, in his capacity as Chairman of the 1969 ASIS Annual Meeting, Bourne invited Engelbart to demonstrate his system at the forthcoming ASIS annual meeting in San Francisco. Engelbart's online demonstration of the AHI system was one of the major attractions at the October 1969 ASIS Annual Meeting in San Francisco (CB note: Was it also shown at the AFIPS Fall Joint Computer Conference in San Francisco in December 1968?). While Engelbart worked his terminal

Charlie, I think SRI has copies of Engelbart's demonstration tape that can be played on a VCR. I had (maybe still 66 have?) copies on tape, but they were not ^{easily} readable by ~~much~~ modern equip. Also, check with Henry Lowood at Stanford who is curator for Doug's papers. I can try to find out ball tapes for you if of interest.

The 1st big demo I am aware of was ARPA's demo of ARPANet at 1ccc/FJCC in 1972 (see notes on back of next page) - P67

on the stage before a large plenary session, his CRT display was shown to the audience by means of a large projected display. This was the first time that most of the people in that audience had seen a large projection of a simultaneous image from a CRT display. This was also the first time that most of the audience had heard of, or seen a "mouse" device. In order to be able to offer this demonstration (something that most conference organizers would have little trouble with nowadays), special grants were obtained from several federal agencies to pay for the very expensive (at that time) high-speed leased lines from San Francisco to SRI's Menlo Park computers (about 40 miles), and the lease and installation of the special large screen graphics display equipment. A film of that 1969 ASIS demonstration has been available for loan from SRI International in Menlo Park, California. (CB note: A footnote to Engelbart's 1973 AFIPS Conference paper notes: "Augmentation of the Human Intellect—A Film of the SRI-ARC Presentation at the 1969 ASIS Conference, San Francisco (A 3-reel movie, Stanford Research Institute Augmentation Research Center, October 1969 (SRI-ARC Catalog Item 9733). CB has been unable to get a response to several queries to the SRI Librarian.) Engelbart's work became familiar to most of the online system developers in the 1960s and '70s because of his earlier publications¹⁵⁶ and his participation in events such as this very visible 1969 ASIS demonstration (CB note: or FJCC), the AFIPS Workshop on the User/Computer Interface in Palo Alto in 1971, and his extensive ARPA project and ARPA workshop activities. An early example of the use of this AHI system with personal workstations in a group conference was given in a 1968 paper by Licklider and Taylor.¹⁵⁷

Another highlight of that 1969 ASIS meeting (besides the local earthquake) was an Online Arena, organized by one of the authors (Bourne) of this text. "For the first time, one could compare live demonstrations of a number of interactive retrieval systems."¹⁵⁸

The AHI program continued for several more years at SRI under the supervision of Engelbart, receiving support primarily from ARPA, NASA, and the USAF Rome Air Development Center. Its innovative work included such developments as a stenotype-like 5-key handset (to be used in either left-handed or right-handed mode) for use by researchers at CRT workstations to permit one-handed input instead of using a typewriter keyboard. Some researchers gained a proficiency of 20-30 words per minute with this device. A much more widely known spinoff from this project was Engelbart's 1965 development of the "mouse" that has become such a common part of so many personal computer systems. The mouse has been credited in many publications to

Try Public Relations
or Marilyn Johnson

AFIPS Meetings

In 1972 ARPA had a big demonstration of the ARPANET.⁶⁷ This was a combined ICC/FJCC conference. Jacques Vallee and myself worked on a user interface to NLS on it and that was the "big flap" meeting I was

Xerox talked to SRI about ~~possibly~~ buying patent rights to SRI's mouse. These talks did not come to any fruition so Xerox developed its own mouse based on different electronic principles (as I recollect) - I don't know the differences between the two, but (patents) should Chapter 3 give that detail. the for SRI + Xerox mouse (mic 3)

Apple Computer, but Steve Jobs and several Apple engineers first saw it at Xerox Palo Alto Research Center (PARC) where it was being used with some new PARC equipment. The mouse was championed at PARC by Bill English who had worked closely with it when he was an engineer working with Engelbart at SRI on the AHI program.^{159,160,161,162}

The AHI effort was still going strong at SRI under Engelbart's direction in the 1970s, under the name of the Augmentation Research Center, and with software called NLS-8 (oNLine System, Version 8).¹⁶³ NLS was made available on a subscription basis through an information utility service with its own computer.^{164,165,166,167,168} Engelbart was also responsible in 1970-72 for the development and operation of the Network Information Center for the ARPA Computer Network.^{169,170}

In the "small-world" department, it was Engelbart who, as a School of Engineering faculty member at the University of California at Berkeley in 1957, introduced the subject of information retrieval to one his students in Electrical Engineering, Charles Bourne, the co-author of this text. The introduction took the form of a student assignment to organize a collection of several hundred abstracts of electrical engineering articles for rapid and effective searching. The actual implementation involved gluing each abstract to a McBee edge-punched card (with a custom-developed subject indexing scheme for the edge-notch coding), with a template to input-mark the card edges, a hog-ear notcher to notch the cards, and a knitting needle to sort the card deck for retrieval purposes. It was a far cry from any of the computer-based systems that Engelbart or Bourne subsequently worked on, but it initiated them into to some general problems inherent in any retrieval system--subject analysis, authority control, input conversion, and retrieval effectiveness! They also worked jointly on considerations of national information system planning in 1958.¹⁷¹

At the time that this text was written, Engelbart was ^{still is} the Director of the Bootstrap Institute in Fremont, California. In 1996 he received a Distinguished Engineering Alumnus Award from the Engineering Alumni Society of the University of California at Berkeley; that award was accompanied by the following text:

Long before most had heard of computing, he envisioned the modern interactive work environment and the computer's potential for responding to the complexity and urgency of human problems. He created the mouse, windows, online "help"

systems, and laid foundations for networking, word processing, electronic mail, and popular use of the internet.

In 1996 he also received the ASIS Special Award in recognition of his enhancement of public access to information and discovery of mechanisms for improved transfer and utilization of knowledge. At the time he was working on the mouse, he was working for SRI, which assumed full rights to the patent. Many millions of mice have been sold since, but Engelbart's compensation by SRI (other than his salary) was limited to a \$10,000 check that they eventually gave to him. In 1997, he won the \$500,000 Lemelson-MIT Prize which is awarded to U.S. inventors and scientific innovators.

Charlie, I don't think SRI made all that much money on the mouse because by the time the mouse became wildly popular, the patent rights had run out.

(CB note: Outstanding issues:

- Who wrote the online project proposal for the remote search system? When?
- How did the AHI Project provide its own file search capability for these memos and reports after the Q-32 connection was broken?
- Any printed record or report to describe the S. F. Conference demonstration?
- Was there a demonstration at the AFIPS Fall Joint Computer Conference?
- What further project documentation can be found?
- How much of this text (e.g. 1968-69 stuff) should be moved to Chap. 5?

Urban Faulstich was SRI's patent attorney for many years + lives in Burney, CA. He might be able to shed some light on this.

It may be also that the gov't (who funded work) really owned patent rights. Check this out too. - I do think SR' owned some patent rights to mouse

Referenced Correct Probably in Lowood's Collection ✓

(CB note: CB is trying to obtain a copy of the following publications:

Douglas C. Engelbart; Bonnie Huddart, "Research on Computer-Augmented Information Management." Final Report. Menlo Park, CA: Stanford Research Institute. March 1965. Report No. ESD-TR-65-168. NTIS Report No. AD-622 520. 132 p. (CB has DTIC citation, but no report. Not in UC MELVYL.)

Douglas C Engelbart, "Augmenting Human Intellect: Experiments, Concepts, and Possibilities," Summary Report. Menlo Park, CA: Stanford Research Institute. March 1965. NTIS Report No. AD-640 989. 72 p. (CB has DTIC citation, but no report. Not in UC MELVYL.)

William K. English; Douglas C. Engelbart; B. Huddart, "Computer-Aided Display Control," Final Report, Menlo Park, CA: Stanford Research Institute, July 1965. NTIS Report

Charlie Anderson gave \$10K award to Doug (I was there) - he might have some info too.

Charlie, I checked these refs and they are correct refs. I would think that Lowood would have them in Engelbart's papers which have been given to Stanford by Doug. I may have some of them - problem is I don't know what I have - it is all randomly boxed in my 60s. Probably don't have anything from my time.

Try Lowood for
some of these - they
may be in Doug's
papers. I'll check my
stuff, but I have very
little before 70's and I
don't know where to
look in my read boxes

Chapter 3

No. ____ p. (Cited in Engelbart/English 1968 FJCC paper.) (Not in DTIC or UC MELVYL system.)

✓ Douglas C. Engelbart; William K. English; J. F. Rulifson, "Development of a Multidisplay, Time-Shared Computer Facility and Computer-Augmented Management-System Research." Final Report. Menlo Park, CA: Stanford Research Institute. October 1968. Report No. RADC-TR-68-250. NTIS Report No. AD-843 577. 29 p. (CB has DTIC citation, but no report. Not in UC MELVYL.)

✓ Douglas C. Engelbart, "Human Intellect Augmentation Techniques," Menlo Park, CA: Stanford Research Institute. January 1969. Report No. NASA-CR-1270. 70 p. (CB has LMSC cite, but no report. Not in UC MELVYL.)

✓ Douglas C. Engelbart; William K. English; David A. Evans, "Study for the Development of Computer Augmented Management Techniques," Interim Technical Report. 8 February 68-8 February 69. Menlo Park, CA: Stanford Research Institute. March 1969. Report No. RADC-TR-69-98. NTIS Report No. AD-855 579. 73 p. (CB has DTIC citation, but no report. Not in UC MELVYL.)

✓ Douglas C. Engelbart, "Computer-Augmented Management-System Research and Development of Augmentation Facility." Final Technical Report 8 February 68-8 February 70. Menlo Park, CA: Stanford Research Institute. April 1970. Report No. RADC-TR-70-82. NTIS Report No. AD-709 211. 281 p. (CB has DTIC citation, but no report. Not in UC MELVYL.)

✓ Douglas C. Engelbart, "Network Information Center and Computer Augmented Team Interaction," Interim Technical Report 8 February 70- 8 February 71. Menlo Park, CA: Stanford Research Institute. Augmentation Research Center. June 1971. Report No. RADC-TR-71-175. NTIS Report No. AD-737 131. 105 p. (CB has DTIC citation, but no report. Not in UC MELVYL.)

✓ Douglas C. Engelbart, "Advanced Intellect—Augmentation Techniques," Menlo Park, CA: Stanford Research Institute. February 1972. Report Nos. NASA-CR-1827; SRI-7079. NTIS Report No. _____. 201 p. (CB has LMSC/LMMS citation, but no report. Not in UC MELVYL.)

✓ *Douglas C. Engelbart, "Experimental Development of a Small Computer Augmented Information System." Annual Report 15 April 71-15 April 72. Menlo Park, CA: Stanford Research Institute. Augmentation Research Center. April 1972. Report No. SRI-ARC-10045. NTIS Report No. AD-742 532. 22 p. (CB has DTIC citation, but no report. Not in UC MELVYL.)*

✓ *Douglas C. Engelbart, "Online Team Environment. (Network Information Center and Computer Augmented Team Interaction.)" Final Technical Report 9 February 71-9 May 72. Menlo Park, CA: Stanford Research Institute. June 1972. Report No. SRI-ARC-13041; RADC-TR-72-232. NTIS Report No. AD-766 005. 272 p. (CB has DTIC citation, but no report. Not in UC MELVYL.)*

✓ *Douglas C. Engelbart, "Knowledge Workshop Development," Final Report. Menlo Park, CA: Stanford Research Institute. Augmentation Research Center. January 1976. Report No. SRI-ARC-22133; RADC-TR-75-304. NTIS Report No. AD-A022 997. 186 p. (CB has DTIC citation, but no report. Not in UC MELVYL.)*

University of Pennsylvania

(CB note: As described earlier in Chapter 2, S. Richard Moyer and Gwendolyn M. Bedford, members of the Institute for Cooperative Research at the University of Pennsylvania, reported in 1957 on a computer system that they had designed for the search of document collections. With the support of the USAF Air Research and Development Command, and the participation of the Philadelphia IBM office, they proposed a system that made use of an IBM 705 computer and extensive bibliographic records on computer tape. The system was not implemented.¹⁷²)

Multilist

On November 30, 1961, two members of a research team at the University of Pennsylvania Moore School of Electrical Engineering unveiled some preliminary results in a technical report.¹⁷³ Noah S. Prywes and Harry Joshua Gray described their development work in online retrieval that had been going on for the previous 18 months, which actually dates the beginning of the project in mid-1960. At the IFIPS Congress in Munich in August 1962, Prywes and Gray and their research team

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Jack is str(?)
around - does he
have copy?